University of Thi-Qar Journal Vol.14 No.3 SEP 2019
Web Site: https://jutq.utq.edu.iq/index.php/main
Email: utj@utq.edu.iq

Contaminants of Nasiriyah thermal power station and its impact on the Euphrates River in Thi Qar city

https://doi.org/10.32792/utq/utj/vol14/4/3

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Abstract:

The research included the study of environmental pollution in the Euphrates River in the vicinity of the power plant in Thi Qar city and its impact on the quality and environment of the river water. The study showed the high values of most physical and chemical properties in the river water, which confirms the effect of the electric station. The samples were taken during the months of February and April of 2019. Six stations were chosen along the river in the study area, two stations before the electric station and two stations next to the station and two stations after the electrical station. The samples were taken from the edge of the river and from the middle and at a depth of (30) cm. The laboratory tests were conducted to calculate the electrical conductivity ,PH and the calcium and magnesium ion rates. The study of properties showed that all levels except PH are not in accordance with the Iraqi and global determinants of potable water as shown in Table (2). We also noticed that these rates were higher in February than in April due to the rain that swept the country and consequently the rise in the water level of the river, which led to a decrease in the percentage of pollutants.

Keywords: environmental pollution, river water environment, pollutant ratio

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الخلاصة :

تضمن البحث دراسة التلوث البيئي في مياه نهر الفرات في المناطق القريبة من محطة توليد الطاقة الكهربائية في محافظة ذي قار وأثره في نوعية وبيئة مياه النهر . أظهرت الدراسة ارتفاع معدلات قيم أغلب الصفات الفيزيائية والكيميائية في مياه النهر , مما يؤكد تأثير المحطة الكهربائية . حيث تم اخذ العينات خلال شهري شباط ونيسان من عام 2019 . وقد اختيرت ستة محطات على امتداد النهر في منطقة الدراسة بواقع محطتين قبل المحطة الكهربائية ومحطتين بجانب المحطة ومحطتين بعد المحطة الكهربائية , وقد اخذت العينات من حافة النهر ومن منتصفه وعلى عمق (30) سم , واجريت الفحوصات المختبرية لحساب معدلات التوصيلية الكهربائية والأس الهيدروجيني وكذلك تم حساب معدلات العسرة الكلية ومعدلات ايوني الكالسيوم والمغنيسيوم , وبينت دراسة الخواص أن معدلاتها جميعا ما عدا الاس الهيدروجيني غير مطابقة للمحددات العراقية والعالمية لمياه الشرب كما مبين في الجدول (2) , ولاحظنا كذلك تفوق تلك المعدلات خلال شهر شباط عنها في شهر نيسان وذلك بسبب موجة الامطار التي اجتاحت البلاد وبالتالي ارتفاع منسوب مياه النهر مما أدى الى تقليل نسبة الملوثات .

1. Introduction

Water is an indispensable source of life in all fields. It is considered the source of life and the basis for development. It is one of the most important essentials for the continuation of life, especially freshwater, which is a limited and endangered resource due to the sovereignty of the desert climate and drought. Different. Therefore, it must be given priority in planning to study, develop and develop it in accordance with its importance. The Euphrates River is particularly important in the province of Thi Qar because it is the main source of water in the governorate. As a result of the sovereignty of dry desert climate and the development of different development requirements. As a result of the continuous decrease in water resources of Iraq. In general, thus reducing its water share, it suffers from changes in its water quality [1].

Pollution is a global problem that is of interest to researchers at present, as it has a clear risk to the components of the environment. Pollution can generally be defined as (a change in the concentration of the physical, chemical or pyelogical properties of the major environmental

constituents of soil, water and air beyond the limit as a result of various human activities)[2].

As for water pollution, many scientists have defined it as "adding human material to the aquatic environment sufficient to cause harm to human health or other living organisms or ecosystems, including rest and recreation"[3] . This definition is broad and comprehensive, can be determined by (the introduction of solid, liquid, gaseous or any form of energy such as heat, sound or radiation to the environment which makes it unsafe to live in excess of the rates that the environment can be absorbed, analyzed or converted into harmless materials).

The environment is that important part of the world in which people are affected and effected. That is, the part that it uses, exploits, influences and adapts to it[4], the human environment means all that affects the human physical, chemical and life, which have clear results on the health of the citizen. Since waste disposal is a natural result of any natural activity, how to get rid of these wastes or to benefit from them has remained one of the greatest human problems in modern times. Therefore, several methods of disposal of sewage (from cities or laboratories) have been found and most commonly discharged into natural waterways without treatment. That the presence of pollutants in these water contribute to the poor quality of water and make it unsuitable for any human use.

Since the rivers, including the Euphrates River, are the main source of human water needs, which receive and reduce man-made pollutants[5],and to determine the validity of its water for different investments, the qualitative properities of river water were assessed through the Raman spectroscopy study, physical and chemical properties to detect the extent of water pollution in Thi Qar city, and then compare the results with local and international standards for the quality of river water and drinking water. And thus assess these waters to determine their suitability for various uses of life.

2.Physical and chemical factors

2-1. Power of hydrogen (PH)

The Ph of the water was measured using the pH-meter (inoLab Ph7110) was produced by the German WTW company and after calibration with the standard buffer solution of pH 4, 7, 9 before work.

PH meter

2-2.Electrical conductivity and salinity

The electric conductivity of the water samples was measured using the E.C-meter E.C-Heter (Sens. Ion5) and expressed the output with

micromenzyme / cm. In terms of electrical conductivity results, the salinity values were calculated in the samples according to Mackereth et al. , 1978). According to the following equation:

Salinity % = E.C × 640 × 10^{-6}

Where E.C is the value of the electrical conductivity and the salinity output is expressed in ppt.

Electrical conductivity measuring device

Total hardness (T.H) :

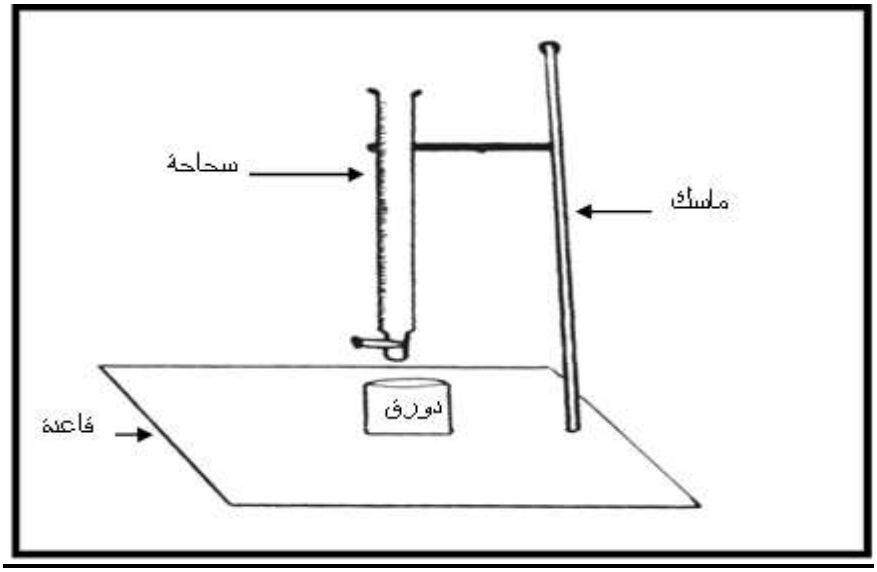
The method described by Lind (1979) was followed by the titration of 25 mL of the sample with EDTA-2Na solution (0.02 N) after adding 1-2 ml of the regulator solution and using the Erichrome Blak T detector and expressed in mg / L.

Calcium and Magnesium (Ca , Mg) :

The method described by the American Public Health Association (APHA, 2003) was applied for Calcium Calculation with EDTA-2Na (0.02 N) after adding 1-2 cm 3 of NaOH solution (1N) to pH to pH 12 and using Murexid revealing and expressing the results in mg / l.

Magnesium concentration in water can be obtained from the results of both total calcification and calcium using the following equation:

Mg(mg/L) = (T.H as $caco_3$ × 2.5) × 0.244



The main parts to determine the ions of salts and chlorine

Results and Discussion

Table (1)

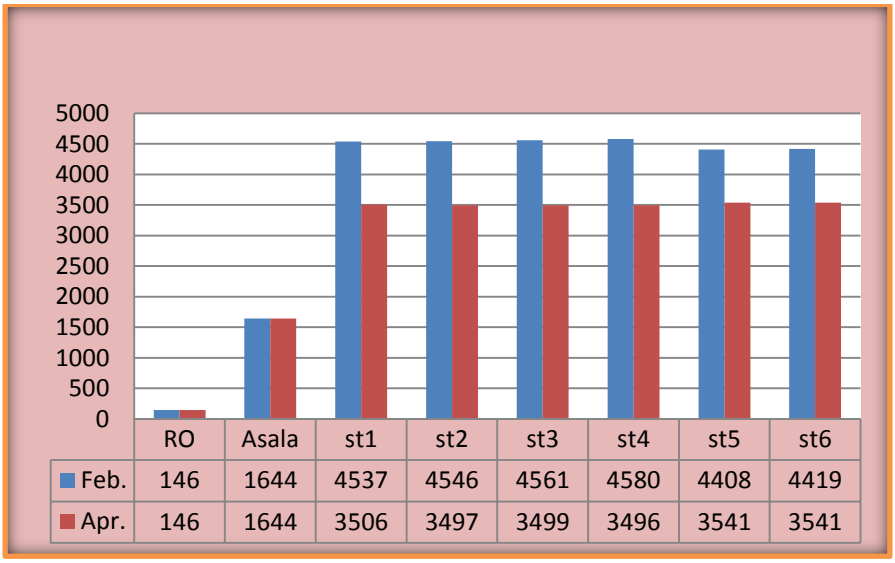
Rate of physical and chemical properties of pH, total hardness, electrical conductivity, calcium and magnesium ions for study sites during the study period.

المحطات	month	PH	T.H	Ca	Mg	E.c
St.1	**Feb.**	8.1	1118	204	148	4537
St.2		8.1	1121	207	147	4546
St.3		7.9	1129	210	147	4561
St.4		8	1136	214	146	4580
St.5		8.1	1092	189	151	4408
St.6		7.8	1104	192	152	4419
St.1	**Apr.**	7.9	881	158	118	3506
St.2		8.1	873	150	121	3497
St.3		8.1	878	152	121	3499
St.4		7.9	874	152	120	3496
St.5		7.9	907	168	118	3541
St.6		7.8	910	170	118	3541
RO		6.7	42	11	3	146
Asals		7.8	579	151	49	1644
Determinants		6.5-8.5	500	200	150	1000

Specific electrical conductivity(E.C) :

The electrical conductivity of the water samples showed a clear difference between the various stations, as shown in diagram (1), where the highest values in the fourth station and the lowest in the fifth station, ranging between (4408 - 4580) micro-Siemens cm^{-1} respectively in February, while we notice a remarkable change between the fourth station and the sixth station during the month of April, where values have ranged between (3496 - 3541) micro-Siemens cm^{-1}, respectively.

The sample of drinking water (RO) recorded values for specific electrical conductivity up to (146) micro-Siemens. cm^{-1}. While the tap water sample values (Asala) I reached (1644) micro-Siemens. cm^{-1}.



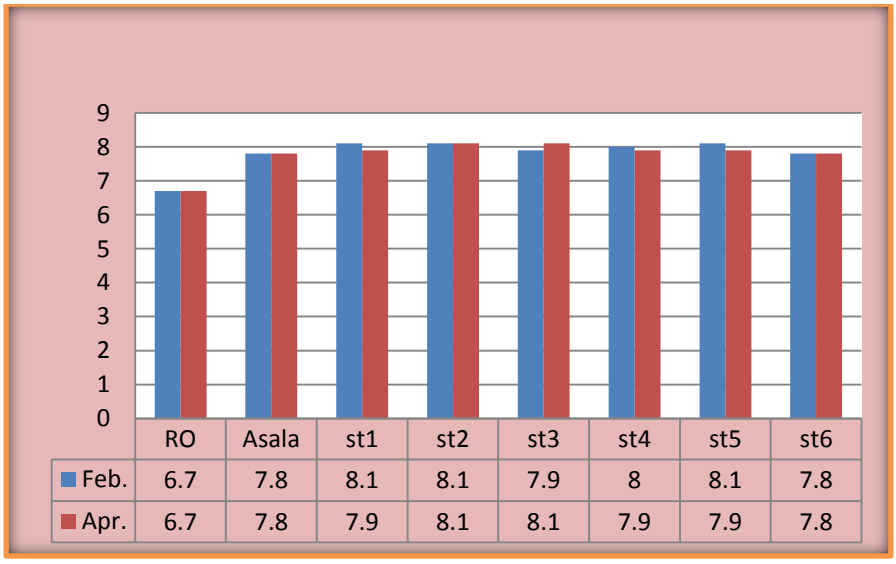
	RO	Asala	st1	st2	st3	st4	st5	st6
Feb.	146	1644	4537	4546	4561	4580	4408	4419
Apr.	146	1644	3506	3497	3499	3496	3541	3541

diagram (1) Monthly and Local Changes the values of electrical conductivity in the studied stations.

Power of hydrogen (PH) :

It was observed from this study that the pH values of the water samples for all the sites are relatively basic where the pH value did not

decrease from (7.0) regardless of location. The pH values for the stations ranged from (1) to (6) in February between (7.8) and 8.1 and the variability of the values of these stations did not exceed (0.3) units of pH. The variability of the stations was constant for the same stations in April Where the same pH range was observed, as shown in diagram (2). The drinking water sample (RO) found that the pH rate was (6.7) while the tap water sample gave a rate of " (7.8).



	RO	Asala	st1	st2	st3	st4	st5	st6
Feb.	6.7	7.8	8.1	8.1	7.9	8	8.1	7.8
Apr.	6.7	7.8	7.9	8.1	8.1	7.9	7.9	7.8

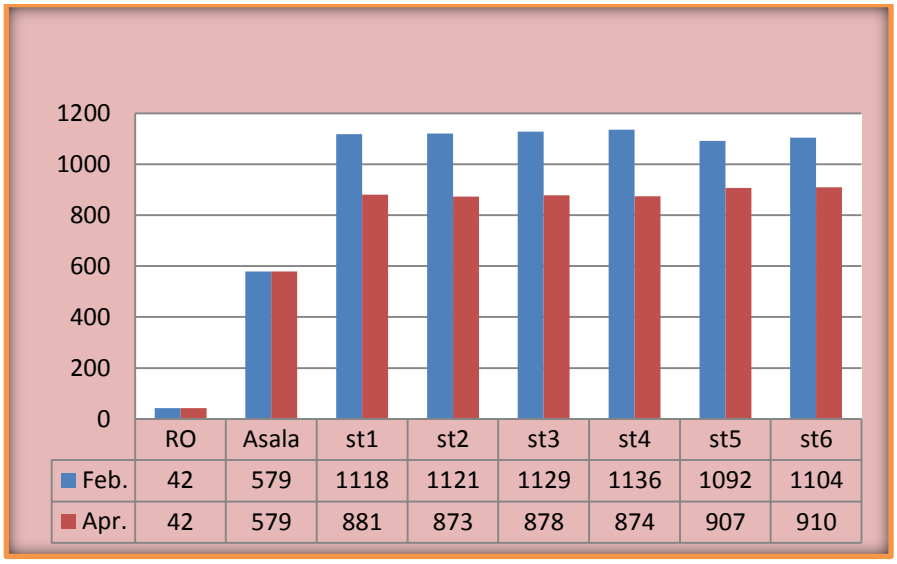
diagram (2) Monthly and local changes of PH values in the studied stations.

Total hardness (T.H) :

Total hardness of water was measured at all stations of study and found that the water is very difficult, especially at the third and fourth stations located near the cooling water discharge stations of the power station on the Euphrates River, where the average values of concentrations between (1129 - 1136) mg. L1-calcium carbonate, respectively, during February.

In the second and fourth stations, the average concentration of the total mass was lower than that of the other stations during the month of April as in diagram (3). The drinking water sample (RO) was the average

value (42) mg. L1 - calcium carbonate while the value rate (579) mg. L1- Calcium carbonate for the tap water sample.



	RO	Asala	st1	st2	st3	st4	st5	st6
Feb.	42	579	1118	1121	1129	1136	1092	1104
Apr.	42	579	881	873	878	874	907	910

diagram (3): Monthly and local changes of the Total Hardness values in the studied stations.

Ionic of Calcium and Magnesium. (Ca , Mg) :

Calcium concentrations showed a significant difference in the course of all study sites. The concentration of calcium ion decreased from (214) mg. L1. In the fourth station during the month of February to (150) milligrams. The concentration of magnesium was observed as the highest value in the sixth station during February and the lowest value was in the same station during the month of April, where the values ranged between (152 - 118) Mg. As shown in diagram. (5), for the sample of drinking water (RO) it was found that the calcium ion concentration (11) mg. L1 - magnesium ion (3) mg. L1, and the sample of water tap (Asala) has given a rate (151) and (49) mg. L1, for Ionic calcium and magnesium respectively.

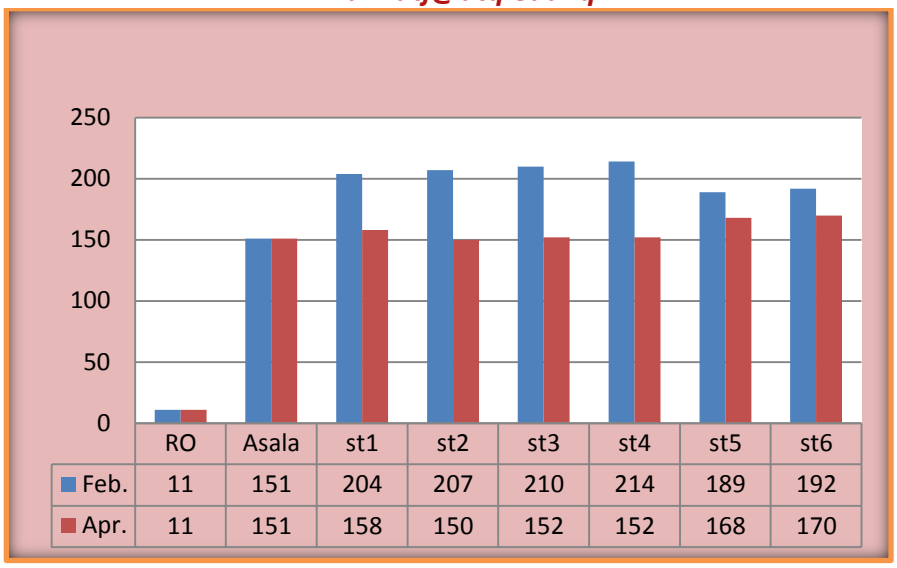


diagram (4) Monthly and local changes of calcium values in the studied stations.

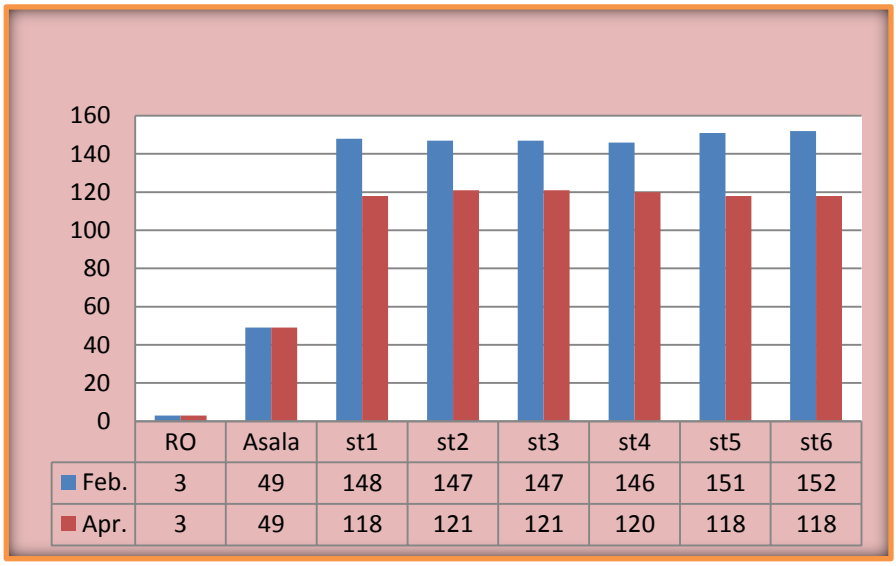


diagram (5) Monthly and local changes of the magnesium values of the studied stations.

Table (2)Iraqi determinants of the quality of water suitable for the aquatic environment
And drinking water for the World Health Organization (WHO)
Compared to the specifications of the Euphrates water per mg / liter except for the indicator in front of it[6,7]

Case	WHO determinants of drinking water	Iraqi determinants of the aquatic environment	Concentration of elements in the Euphrates River	Element
Non Identical	1000	1000	4010	(µs/cm) Electrical conductivity
Identical	6.5-8.5	6.5-8.5	7.9	PH
Non Identical	100-500	160-480	1001	Total Hardness
non identical in drinking only	75	Less than 200	180	Calcium
Non Identical	10-25	50	133	Magnesium

Conclusions:

- The quality of the Euphrates River in the province of Dhi Qar is constantly changing, the rates of electrical connection (4508) and (3513) while the average value of the total severity (1116) and (887) during the months of February and April, respectively. This change reflects the intensity of the volume of contaminants and the resulting, as well as the lack of maintenance projects and poor efficiency, which

can leave these changes have negative effects on several aspects of development, for example, aspects of agricultural development, where these changes contribute to the decline of cultivated areas and leave a significant proportion of the labor force on agricultural land from work leading to increased rural unemployment. For the purpose of maintaining the quality of water resources in the Euphrates River and developing its efficiency for investment, the following measures are required :

1- The need to regulate the volume of running water in the Euphrates River according to different investment requirements.

2- The need to encourage studies and research and benefit from the expertise, skills and experience in the field of river conservation and development of quality, in line with its importance as a major resource for development in various fields.

3- Control the sources of pollution of all kinds.

4- That the governmental institutions have a role in this area through the formation of joint committees between the various departments involved in this matter to address the problems experienced by the river.

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